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|  | **2018** |
|  | Κωνσταντίνα Μπισιρίτσα  ΑΕΜ 4485 |

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## Biome

## Main article: [Biome](https://en.wikipedia.org/wiki/Biome)

Biomes are bigger units of organization that categorize regions of the Earth's ecosystems, mainly according to the structure and composition of vegetation.[[42]](https://en.wikipedia.org/wiki/Ecology#cite_note-Palmer94-42) There are distingt methods to define the continental boundaries of biomes dominated by different practical types of vegetative communities that are limited in distribution by climate, precipitation, weather and other environmental variables. Biomes include [warm rainforest](https://en.wikipedia.org/wiki/Tropical_rainforest" \o "Tropical rainforest), [temperate broadleaf and mixed forest](https://en.wikipedia.org/wiki/Temperate_broadleaf_and_mixed_forest), [temperate deciduous forest](https://en.wikipedia.org/wiki/Temperate_deciduous_forest), [taiga](https://en.wikipedia.org/wiki/Taiga), [tundra](https://en.wikipedia.org/wiki/Tundra), [hot desert](https://en.wikipedia.org/wiki/Hot_desert), and [polar desert](https://en.wikipedia.org/wiki/Polar_desert).[[43]](https://en.wikipedia.org/wiki/Ecology#cite_note-Prentice92-43) Other researchers have recently categorized other biomes, such as the human and oceanic [microbiomes](https://en.wikipedia.org/wiki/Microbiome). To a [microbe](https://en.wikipedia.org/wiki/Microorganism), the human body is a habitat and a landscape.[[44]](https://en.wikipedia.org/wiki/Ecology#cite_note-Turnbaugh07-44) Microbiomes were discovered largely through advances in [molecular genetics](https://en.wikipedia.org/wiki/Molecular_genetics), which have revealed a hidden richness of microbial diversity on the planet. The oceanic microbiome plays a significant role in the ecological biogeochemistry of the planet's oceans.

## Biosphere

## Main article: [Biosphere](https://en.wikipedia.org/wiki/Biosphere)

### See also: [Earth's spheres](https://en.wikipedia.org/wiki/Earth%27s_spheres)

The largest scale of ecological organization is the biosphere: the total sum of ecosystems on the planet. [Ecological relationships](https://en.wikipedia.org/wiki/Ecological_relationship) regulate the flux of energy, nutrients, and climate all the way up to the planetary scale. For example, the dynamic history of the planetary atmosphere's CO2 and O2 composition has been affected by the biogenic flux of gases coming from respiration and photosynthesis, with levels fluctuating over time in relation to the ecology and evolution of plants and animals.[[46]](https://en.wikipedia.org/wiki/Ecology#cite_note-igamberdiev06-46) Ecological theory has also been used to explain self-emergent regulatory phenomena at the planetary scale: for example, the [Gaia hypothesis](https://en.wikipedia.org/wiki/Gaia_hypothesis) is an example of [holism](https://en.wikipedia.org/wiki/Holism) applied in ecological theory.[[47]](https://en.wikipedia.org/wiki/Ecology#cite_note-Lovelock73-47) The Gaia hypothesis states that there is an emergent [feedback loop](https://en.wikipedia.org/wiki/Feedback_loop) generated by the metabolism of living organisms that maintains the core temperature of the Earth and atmospheric conditions within a narrow self-regulating range of tolerance.

## Individual ecology

## See also: [Life history theory](https://en.wikipedia.org/wiki/Life_history_theory), [Ecophysiology](https://en.wikipedia.org/wiki/Ecophysiology), and [Metabolic theory of ecology](https://en.wikipedia.org/wiki/Metabolic_theory_of_ecology)

Understanding traits of individual organisms helps explain patterns and processes at other levels of organization including populations, communities, and ecosystems. Several areas of ecology of evolution that focus on such traits are [life history theory](https://en.wikipedia.org/wiki/Life_history_theory), [ecophysiology](https://en.wikipedia.org/wiki/Ecophysiology), [metabolic theory of ecology](https://en.wikipedia.org/wiki/Metabolic_theory_of_ecology), and [Ethology](https://en.wikipedia.org/wiki/Ethology). Examples of such traits include features of an organisms life cycle such as age to maturity, life span, or metabolic costs of reproduction. Other traits may be related to structure, such as the spines of a cactus or dorsal spines of a bluegill sunfish, or behaviors such as courtship displays or pair bonding. Other traits include emergent properties that are the result at least in part of interactions with the surrounding environment such as growth rate, resource uptake rate, winter, and deciduous vs. drought deciduous trees and shrubs.

One set of characteristics relate to body size and temperature. The [metabolic theory of ecology](https://en.wikipedia.org/wiki/Metabolic_theory_of_ecology) provides a predictive qualitative set of relationships between an organism’s body size and temperature and metabolic processes. In general, smaller, warmer organisms have higher metabolic rates and this results in a variety of predictions regarding individual somatic growth rates, reproduction and population growth rates, population size, and resource uptake rates.

The traits of organisms are subject to change through acclimation, development, and evolution. For this reason, individuals form a shared focus for ecology and for [evolutionary ecology](https://en.wikipedia.org/wiki/Evolutionary_ecology).

Complex Table (less Accesible)

**Class Schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LESSON | TOPIC | ASSIGNMENT | Points | Due |
| 1 | What is Distance Learning? | Wiki #1 | 10 | March 10 |
| Presentation | 20 |  |
| 2 | History & Theories | Brief Paper | 20 | March 24 |
| Spring Break | | | | |
| 3 | Distance Learners | Discussion #1 | 10 | April 7 |
| Group Project | 50 | April 14 |
| 4 | Media Selection | Blog #1 | 10 | April21 |

# Metapopulations and migration

## Main article: [Metapopulation](https://en.wikipedia.org/wiki/Metapopulation)

### http://www.springboardmagazine.com/SpringImages/lifecycle_apple.gifSee also: [Animal migration](https://en.wikipedia.org/wiki/Animal_migration)

The concept of metapopulations was defined in 1969[[55]](https://en.wikipedia.org/wiki/Ecology#cite_note-Levins69-55) as "a population of populations which go extinct locally and recolonize".[[56]](https://en.wikipedia.org/wiki/Ecology#cite_note-Levins70-56):105 Metapopulation ecology is another statistical approach that is often used in [conservation research](https://en.wikipedia.org/wiki/Conservation_biology).[[57]](https://en.wikipedia.org/wiki/Ecology#cite_note-Smith05-57) Metapopulation models simplify the landscape into patches of varying levels of quality,[[58]](https://en.wikipedia.org/wiki/Ecology" \l "cite_note-Hanski98-58) and metapopulations are linked by the migratory behaviours of organisms. Animal migration is set apart from other kinds of movement; because, it involves the seasonal departure and return of individuals from a habitat.[[59]](https://en.wikipedia.org/wiki/Ecology#cite_note-Nebel10-59) Migration is also a population-level phenomenon, as with the migration routes followed by plants as they occupied northern post-glacial environments. Plant ecologists use pollen records that accumulate and stratify in wetlands to reconstruct the timing of plant migration and dispersal relative to historic and contemporary climates. These migration routes involved an expansion of the range as plant populations expanded from one area to another. There is a larger taxonomy of movement, such as commuting, foraging, territorial behaviour, stasis, and ranging. Dispersal is usually distinguished from migration; because, it involves the one way permanent movement of individuals from their birth population into another population.[[60]](https://en.wikipedia.org/wiki/Ecology#cite_note-Clark98-60)[[61]](https://en.wikipedia.org/wiki/Ecology#cite_note-Dingle96-61)

In metapopulation terminology, migrating individuals are classed as emigrants (when they leave a region) or immigrants (when they enter a region), and sites are classed either as sources or sinks. A site is a generic term that refers to places where ecologists sample populations, such as ponds or defined sampling areas in a forest. Source patches are productive sites that generate a seasonal supply of [juveniles](https://en.wikipedia.org/wiki/Juvenile_(organism)) that migrate to other patch locations. Sink patches are unproductive sites that only receive migrants; the population at the site will disappear unless rescued by an adjacent source patch or environmental conditions become more favourable. Metapopulation models examine patch dynamics over time to answer potential questions about spatial and demographic ecology. The ecology of metapopulations is a dynamic process of extinction and colonization. Small patches of lower quality (i.e., sinks) are maintained or rescued by a seasonal influx of new immigrants. A dynamic metapopulation structure evolves from year to year, where some patches are sinks in dry years and are sources when conditions are more favourable. Ecologists use a mixture of computer models and [field studies](https://en.wikipedia.org/wiki/Field_study) to explain metapopulation structure.

# Holism

## Main article: [Holism](https://en.wikipedia.org/wiki/Holism)

Holism remains a critical part of the theoretical foundation in contemporary ecological studies. Holism addresses the [biological organization](https://en.wikipedia.org/wiki/Biological_organisation) of life that [self-organizes](https://en.wikipedia.org/wiki/Systems_biology) into layers of emergent whole systems that function according to non-reducible properties. This means that higher order patterns of a whole functional system, such as an [ecosystem](https://en.wikipedia.org/wiki/Ecosystem), cannot be predicted or understood by a simple summation of the parts.[[104]](https://en.wikipedia.org/wiki/Ecology#cite_note-Liu09-104) "New properties emerge because the components interact, not because the basic nature of the components is changed."[[6]](https://en.wikipedia.org/wiki/Ecology#cite_note-Odum05-6):8

Ecological studies are necessarily holistic as opposed to [reductionistic](https://en.wikipedia.org/wiki/Reductionistic).[[36]](https://en.wikipedia.org/wiki/Ecology#cite_note-Levins80-36)[[99]](https://en.wikipedia.org/wiki/Ecology#cite_note-Odum1977-99)[[105]](https://en.wikipedia.org/wiki/Ecology#cite_note-Mikkelson10-105) Holism has three scientific meanings or uses that identify with ecology: 1) the mechanistic complexity of ecosystems, 2) the practical description of patterns in quantitative reductionist terms where correlations may be identified but nothing is understood about the causal relations without reference to the whole system, which leads to 3) a [metaphysical](https://en.wikipedia.org/wiki/Metaphysics) hierarchy whereby the causal relations of larger systems are understood without reference to the smaller parts. Scientific holism differs from [mysticism](https://en.wikipedia.org/wiki/Mysticism) that has appropriated the same term. An example of metaphysical holism is identified in the trend of increased exterior thickness in shells of different species. The reason for a thickness increase can be understood through reference to principles of natural selection via predation without need to reference or understand the [biomolecular](https://en.wikipedia.org/wiki/Biomolecular) properties of the exterior shells.